

Problem 1 (50 points)

True, false or unclear. Explain your answers. You can at most get half point for a correct answer without explanations.

1. The monopolistic competition model with the addition of CES utility has implications that fit the empirical evidence on the Canada-U.S. Free Trade Agreement rather well.

Answer: This is discussed on pp. 123–125 in Feenstra, and a good answer here could be something like "it depends on how you look at it". The scale effect has not been borne out empirically according to Feenstra and the cited studies. Some evidence in favour of the selection effect is found, especially when one allows for differences in productivity across firms. This is, however, not part of the original Krugman model, and this ought to be mentioned.

2. Consider the Dornbusch/Fisher/Samuelson model of continuous goods and two countries. Suppose there is an increase in productivity abroad. This will benefit home.

Answer: False/uncertain. Increases in productivity, which are close to the "indifferent" product, will lower home welfare whereas increases in productivity that are concentrated where the two countries do not compete will increase home welfare. Without more information one cannot say.

3. As the optimal percentage tariff equals the inverse of the elasticity of foreign export supply, the optimal tariff under perfect competition is zero. The optimal tariff under imperfect competition is also zero.

Answer: This is not entirely correct. First, the optimal import tariff under perfect competition is zero for a small country but positive for a large country. Second, under imperfect competition, one also sees a rationale for positive tariffs when the home country imports from a foreign monopolist under certain conditions described on page 226 in Feenstra. It is also very likely that positive tariffs are optimal under Cournot duopoly. Under Bertrand duopoly, the sign of the optimal tariff depends on the behavior of the elasticity of demand, as described in Feenstra.

4. Imposing an import quota or imposing an import tariff are equivalent when markets are competitive and the home government sells the quota (and gets the revenue).

True: Two reasons why import quotas might be worse is when there is market power or when the home government lets foreign governments get the revenue.

5. Suppose Denmark and Greece are modeled according to the Heckscher-Ohlin model. Both countries are in the cone of diversification (they produce both goods). Trade is costless. Denmark is capital abundant. Then wages will be higher in Denmark.

False. There is factor price equalization in the Heckscher-Ohlin model.

6. To obtain a theoretical model explaining "intra-industry trade" it is crucial to resort to assumptions of monopolistic competition, love of variety, and increasing returns.

This is, in fact, not true. While these assumptions are key elements in the important monopolistic competition model (Krugman, 1979; Feenstra ch. 5), these assumptions are not necessary for intra-industry trade to occur. This is so because the reciprocal dumping model (Brander, 1981; Brander and Krugman, 1983; Feenstra ch. 8) also features intra-industry trade even though you see homogeneous goods and Cournot competition in those reciprocal dumping models. If you wrote something clever about the monopolistic competition model, you will nevertheless have received some good points here.

7. The European Economic Community (EEC) is one example of a free trade area.

This is incorrect. The EEC is a customs union. It is natural to discuss the differences between these two agreements.

Problem 2 – Reciprocal Dumping (50 points)

Suppose there are two identical countries, Home and Foreign (*). Each country has a single firm producing identical product using identical production technologies: The marginal cost of production is c and there are fixed costs of F .

The two markets are segmented, such that each firm regards each country as a separate market, and the firms engage in Cournot competition.

Trade is costly as it involves an iceberg transportation cost, $\tau \geq 1$ when shipping internationally.

The prices in Home and Foreign are:

$$p(x + y) \quad \text{and} \quad p(x^* + y^*)$$

where the firm in Home sells x units in Home and x^* units in Foreign, and the firm in Foreign sells y units in Home and y^* units in Foreign.

Question 1. Find the first-order conditions from profit maximization for the two firms from operating in the Home country.

The profit functions for the two firms are:

$$\begin{aligned}\pi &= p(x + y)x + p(x^* + y^*)x^* - c(x + \tau x^*) - F \\ \pi^* &= p(x + y)y + p(x^* + y^*)y^* - c(y^* + \tau y) - F\end{aligned}$$

The first-order conditions for Home are then

$$\begin{aligned}\text{Home firm: } p'(x + y)x + p(x + y) - c &= 0 \\ \text{Foreign firm: } p'(x + y)y + p(x + y) - c\tau &= 0\end{aligned}$$

These are "best-reply" functions in implicit form

Question 2. Let λ be Foreign's share of Home's market, $y/(x + y)$ and the elasticity of demand is $\sigma = -(p'(x + y)(x + y)/p(x + y))^{-1}$. Show that the best response functions can then be written as:

$$p = \frac{c\sigma}{\sigma + \lambda - 1} \tag{1}$$

$$p = \frac{\tau c\sigma}{\sigma - \lambda} \tag{2}$$

Answer: For the Home firm: Divide through by p :

$$p'x + p - c = 0 \Leftrightarrow \frac{p'x}{p} + 1 = \frac{c}{p}$$

Multiply and divide by $(x + y)$:

$$\frac{p'(x + y)}{p} \frac{x}{x + y} + 1 = \frac{c}{p} \Leftrightarrow -\frac{1}{\sigma}(1 - \lambda) + 1 = \frac{c}{p}$$

Rearrange:

$$\frac{\sigma + \lambda - 1}{\sigma} = \frac{c}{p} \Leftrightarrow p = \frac{c\sigma}{\sigma + \lambda - 1}$$

For the Foreign firm: Divide through by p :

$$p'y + p - \tau c = 0 \Leftrightarrow \frac{p'y}{p} + 1 = \frac{\tau c}{p}$$

Multiply and divide by $(x + y)$:

$$\frac{p'(x + y)}{p} \frac{y}{x + y} + 1 = \frac{\tau c}{p} \Leftrightarrow -\frac{\lambda}{\sigma} + 1 = \frac{\tau c}{p}$$

Rearrange:

$$\frac{\sigma - \lambda}{\sigma} = \frac{\tau c}{p} \Leftrightarrow p = \frac{\tau c \sigma}{\sigma - \lambda}$$

Question 3. The best response functions in equations (1) and (2) are two equations in the two unknowns λ and p . Solve for these.

Answer: Rearrange the best response functions to get:

$$\lambda = \frac{\tau + (1 - \tau)\sigma}{1 + \tau}$$

$$p = \frac{c\sigma(1 + \tau)}{2\sigma - 1}$$

Question 4. Dumping is defined as one firm exporting its good at a lower price than it is charging domestically. In what sense does (reciprocal) dumping occur in this model?

From the best response functions in equations (1) and (2) we see that the mark-ups over marginal costs for the Home and Foreign firms are, respectively:

$$\frac{\sigma}{\sigma + \lambda - 1} > \frac{\sigma}{\sigma - \lambda}$$

I.e. the Home firm has a higher mark-up than the Foreign firm. It is in this sense that reciprocal dumping occurs here. Note that this is somewhat different than the definition of dumping, which requires the Foreign firm to charge a lower price (not only a lower mark-up).